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SEEDBED TREATMENT INCREASES DOMINANCE OF NATURAL LOBLOLLY PINE REPRODUCTION

In 1951 a 30-acre mature stand of loblolly pine on Maryland's Eastern Shore was cut, leaving 10 pine seed trees per acre; and three different methods of seedbed preparation were tried on experimental plots within the stand. Besides a control plot, which was only logged, the plot treatments included: (a) pulling a stump with a small bulldozer before cutting, followed by a late-summer fire after cutting; (b) pulling a Ranger Pal plow with the same bulldozer before cutting; and (c) using a late-summer fire after cutting. Since tractor treatments (a and b above) were restricted to creating paths 6 to 10 feet apart, and since the fire was intense, the latter produced a better seedbed and greater reduction in competing vegetation (1).

Results

Five years after treatment, all plots contained large amounts of pine reproduction. Treated plots had 5,500 to 10,160 seedlings per acre, and 94 to 98 percent of their sampled milacre quadrats were stocked with at least one pine seedling. The control plot had 6,960 small pines per acre, stocking 82 percent of the quadrats.

In the fall of 1956 the average height of the tallest pines on stocked quadrats was 6.7 feet where stump dragging and summer burning had been used, 5.5 feet in the summer-burned area, 4.2 feet in the plot plowed before cutting, and 3.0 feet in the control. However, the largest individuals in the study area were 8 to 11 feet tall. Reproduction of this size occurred on 40 percent of the sample quadrats in the stump-dragged and summer-burned plot, 18 percent in the summer-burned plot, 10 percent in the plowed plot, and only 2 percent in the check.

The number of hardwood seedlings and sprout clumps increased in all plots between 1952 and 1956. The increase was greater in the burned plots (1,370 per acre) than in the unburned plots (630 per acre). However, in 1952, a year after cutting, the burned plots had contained 2,580 fewer hardwoods per acre than the unburned plots. In 1956 hardwoods were found on 86 to 100 percent of the sample quadrats in all plots.

The tallest hardwoods were 2.6 feet shorter (average) in the burned plots than in the unburned plots--5.8 feet compared to 8.4 feet. However, their average height growth between 1952 and 1956 was 4 feet in all treated plots, in contrast to 3 feet in the control.

The most important effect of the seedbed treatments will be on future stand composition. To estimate this effect, the tallest pine on each sample quadrat was classified in one of the following categories: (a) dominant; (b) equal in height to competing hardwoods and shrubs; (c) shorter than competing hardwoods and shrubs, but in a small hole so that it might become a part of the overstory; and (d) overtopped. The results (table 1) indicate that pines will form a relatively pure stand, probably 90 percent of the next overstory, in the stump-dragged and summer-burned plot. In the summer-burned plot they may form 75 percent of the next overstory; in unburned plots (whether plowed or not), about 50 percent. Plowing as used in this study created so little disturbance that its effect on the next stand will apparently be negligible.

A seed-tree cutting alone cannot usually be expected to give so good results as in this study. Here, seed trees were selected from the most prolific producers of cones in

Table 1.—Position of pine reproduction in relation to competing vegetation¹

| Seedbed treatment | Quadrats with pines— | | | |
|------------------------------|----------------------|----------------------|----------------|----------------|
| | Dominant | Equal to competitors | In small hole | Overtopped |
| | <u>Percent</u> | <u>Percent</u> | <u>Percent</u> | <u>Percent</u> |
| Stump-dragged, summer burned | 54 | 32 | 4 | 8 |
| Summer-burned | 28 | 30 | 20 | 16 |
| Plowed | 2 | 12 | 40 | 40 |
| None | 2 | 22 | 26 | 32 |

¹Percentage figures are based on all quadrats sampled, including those not stocked.

the stand, and the cutting was made just before an exceptionally heavy crop of pine seed matured. Usually there would be much less seed, because of less fruitful trees or a poorer crop. Then seedbed treatments would be far more important, both in establishing an adequate amount of pine reproduction and in providing for its dominance over competing vegetation.

Costs of Seed-tree Cutting and Summer Burning

What would be the cost of natural reproduction established by seed-tree cutting and a summer fire? If living seed trees could have been salvaged with no decrease in stumpage value, and if volume loss were limited to 15 percent (2), the seed-tree cost would have been about \$10 per acre. The average cost of summer burns used on the Eastern Shore has been about \$8 per acre, relatively high because most of the areas have been small (10 to 40 acres) and have adjoined other woodlands that had to be protected. Thus, the two treatments combined may cost about \$18 an acre. However, their possible use is limited to years when a good crop of pine seed is produced and to times when summer burning is feasible (1).

Conclusions

The 5-year results from testing seedbed-preparation methods in combination with seed-tree cutting in mature loblolly pine on Maryland's Eastern Shore show that:

- The more effective seedbed treatments tested increased the amount of pine reproduction, its stocking, and its early height growth.
- Although reductions in the number of hardwood seedlings and sprout clumps tended to be temporary, their height in the most effective treatments was appreciably less after 5 years than in areas that were only logged.
- Effective treatments that blanket areas, such as the summer-burning method tested here, can be expected to materially increase the proportion of pine in the succeeding stand.

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